

Money, Credit and Velocity

MACK OTT

Shakespeare: "Neither borrower, nor a lender be" (*Hamlet*, I, iii, 75, Polonius to Laertes)

Goethe: "Let us live in as small a circle as we will, we are either debtors or creditors before we have had time to look around." (*Elective Affinities*, Bk. II, Ch. 4)

RECENTLY, many critics of monetary policy, and some monetary policymakers as well, have asserted that the links between monetary aggregates and national economic policy variables—that is, GNP, inflation and real economic growth—have been severed by a host of financial and credit market innovations. If these critics are correct, then a monetary policy based on targeting the growth of a monetary aggregate would become increasingly ineffective and inappropriate, as credit arrangements are substituted for monetary payments.¹

The purpose of this article is to provide a theoretical framework in which to assess these claims

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¹For examples, see Neil G. Berkman, "Abandoning Monetary Aggregates," in *Controlling Monetary Aggregates III*, proceedings of a conference sponsored by the Federal Reserve Bank of Boston (October 1980), pp. 76-100; Benjamin M. Friedman, "The Relative Stability of Money and Credit 'Velocities' in the United States: Evidence and Some Speculations," NBER Working Paper No. 645 (March 1981); Anthony M. Solomon, "Financial Innovation and Monetary Policy" (remarks before the Joint Luncheon of the American Economic and American Finance Associations, December 28, 1981); James M. Tobin, "Inflation," in *Encyclopedia of Economics*, Douglas Greenwald, ed. (McGraw-Hill, 1982), pp. 510-23. For the contrary position—i.e., that monetary policy should be undertaken through effective control of a monetary aggregate—see Milton Friedman, "Monetary Policy: Theory and Practice," *Journal of Money, Credit and Banking* (February 1982), pp. 98-118; and Allan H. Meltzer, Robert H. Rasche, Stephen H. Axilrod, and Peter Sternlight, "Money, Credit, and Banking Debate: Is the Federal Reserve's Monetary Control Policy Misdirected?" *Journal of Money, Credit and Banking* (February 1982), pp. 119-47.

and to examine empirical evidence bearing on their purported policy consequences. The analysis presented in this article does not support the critics' assertions. This conclusion rests on two arguments. First, the relation between money and credit requires that the amount of credit granted match the anticipated amount of money that will be available to settle the debt when it comes due. Thus, regulating the rate of monetary growth, which in turn regulates the anticipated future quantity of money, determines the amount of credit and the conditions under which it is granted. This constraining influence of monetary growth on credit would be undone only if the relation between money and income growth departed from its historical pattern.

That it has not is the second argument: the empirical evidence on velocity, the relation between money growth and income growth, reveals no significant change during the last two years from its previous history. Consequently, despite recent claims to the contrary, the growth of the monetary aggregates is still reliably linked to the economic variables of interest to policymakers.

MONEY, CREDIT AND EXCHANGE

In contemporary societies, the exchange of goods is indirect. The purchase or sale of goods, whether in organized markets or through informal arrangements, is almost always in exchange for money or money-denominated promises. Direct bartering of one good for another is either nonexistent or unimportant.

The reason for this is at once obvious, yet theoretically challenging to elucidate. In the introduction to his book, *The Theory of Money*, Jurg Niehans observes:

Economists (and laymen) have always felt that the use of a medium of exchange increases the efficiency

of an economy. The gain was usually considered to be large. It has both qualitative and quantitative aspects. The qualitative aspects appear when monetary exchange is compared with barter. Classical and neo-classical economists were graphic in describing the "double coincidence of wants" of the hungry tailor and the shivering baker which would be necessary for an exchange in a barter economy and the narrow limitations it imposes on the division of labor. The use of money would increase welfare by freeing exchange from the shackles of the double coincidence of wants.²

Robert Clower succinctly summarized the results of these advantages as imposing a constraint on the exchange process: "Money buys goods and goods buy money; but goods do not buy goods."³ In other words, it is the nature of a system of monetary exchange to replace the cumbersome barter exchange of goods with two non-synchronized monetized exchanges: a sale of goods for money and a later purchase of goods by money. This exchange attribute in turn has implications for both the appropriate definition of money and for the monetary arrangements used in exchange.⁴

First, the period between the sale of one good for money and the subsequent purchase of another good may be long enough or predictable enough to allow the interim holding of funds in a non-transaction account. This implies that the appropriate monetary aggregate may not be narrowly defined money (i.e., M1), but a broader aggregate (e.g., M2) which con-

tains what Milton Friedman characterizes as "temporary abodes of purchasing power" that are readily convertible at low cost into an exchange medium.⁵

Second, if the purchase of the good to be financed by the proceeds from the sale of another good precedes the sale of that other good, then the anticipated future sale proceeds may be used to mediate the earlier purchase. Of course, an exchange arrangement like this is a familiar part of modern economies; such purchases are said to be made "on credit." Credit is granted by sellers or other third party lenders to buyers precisely on the basis of the buyer's anticipated future receipts (with the lender concurring) and, of course, is measured in monetary units. As a consequence, credit is as much of a medium of exchange as is money.⁶

While both credit and money are used to mediate exchange, they are obviously different entities. The quantity of money circulating in an economy is a stock; its units are used repeatedly in a sequence of exchanges. Credit, on the other hand, is a flow and is transaction-specific; it can only mediate the transaction for which it was created.⁷

²Jurg Niehans, *The Theory of Money* (Johns Hopkins University Press, 1978), p. 2.

³Robert W. Clower, "A Reconsideration of the Microfoundations of Monetary Theory," *Western Economic Journal* (March 1967), p. 6. Also, see Karl Brunner and Allan H. Meltzer, "The Uses of Money: Money in the Theory of An Exchange Economy," *American Economic Review* (December 1971), pp. 784-805.

⁴Milton Friedman and Anna Schwartz described this attribute as "the separation of the act of purchase from the act of sale," but criticized the medium of exchange approach as being too narrow to capture the essential nature of money:

In order for the act of purchase to be separated from the act of sale, there must indeed be something that will be generally accepted in payment—this is the feature emphasized in the "medium of exchange" approach. But also there must be something that can serve as a temporary abode of purchasing power, in which the seller holds the proceeds in the interim between sale and subsequent purchase or from which the buyer can extract the general purchasing power with which he pays for what he buys. . . . Both features are necessary to permit the act of purchase to be separated from the act of sale, but the 'something' that is generally accepted in payment need not coincide with the 'something' that serves as a temporary abode of purchasing power; the latter may include the former and more besides.

Milton Friedman and Anna Schwartz, *Monetary Statistics of the United States: Estimates, Sources, Methods* (NBER, 1970), pp. 106-07.

⁵Two goods that are perfect substitutes are economically the same good. If two durable goods are costlessly transformable, one into the other, then they are perfect substitutes in an inventory. On this criterion, if the cost of transferring funds from a savings account to a demand account or to currency were zero, then, clearly, savings accounts would be economically indistinguishable from demand accounts or currency and would be exchange media. Conversely, if the costs of transfer were prohibitively large, savings accounts would not be a close substitute for demand deposits. Hence, as Friedman and Schwartz argue, the question of what money is cannot be settled on an a priori basis, but is an empirical question which, in part, depends on how costly inter-deposit transfers are.

⁶This observation has led Clower and others to argue that some measure of *credit availability* or line of credit be included in the policy relevant concept of money: ". . . for most practical purposes, 'money' should be considered to include trade credit as well as currency and demand deposits." Robert W. Clower, "Theoretical Foundations of Monetary Policy," in *Monetary Theory and Monetary Policy in the 1970s*, George Clayton, John C. Gilbert and Robert Sedgwick, eds. (Oxford University Press, 1971), p. 18. See also Arthur B. Laffer, "Trade Credit and the Money Market" (March 1970), pp. 239-67; and J. Stephen Ferris, "A Transactions Theory of Trade Credit Use," *Quarterly Journal of Economics* (May 1981), pp. 243-70.

⁷It has been argued that credit is not an exchange medium, but merely an arrangement that raises the velocity of money. Ironically, the same argument was once used against including demand deposits in money. As Friedman and Schwartz point out, much of the 19th century debate between the banking and currency schools centered on whether bank notes and deposits were money or merely "means of raising the velocity of bank vault cash but not as adding to the quantity of money." Friedman and Schwartz, *Monetary Statistics of the United States*, p. 95.

BOTH CREDIT AND MONEY ARE NECESSARY FOR MONETIZED EXCHANGE

The epigraphs from Shakespeare and Goethe represent conflicting views on the desirability and inevitability of credit; to wit, while money and credit are alternative exchange media, would either be sufficient to mediate all exchanges without the other? Could any of us, as Polonius suggests, avoid credit transactions completely? Conversely, could credit function as we know it without a monetary framework? Not surprisingly, the answer to both questions is no. Hence, the advice of Polonius is as fatuous as the character offering it. Both credit and money are necessary in the exchange process, each fulfilling functions that the other could not.

In order to establish this complementarity of money and credit, consider the exchange process as a contractual arrangement between buyer and seller.⁸ Under this characterization, the exchange and the settlement of the contract *need not coincide in time* so that either credit or money can mediate an exchange. In the case of a credit transaction, at the time of the exchange the buyer incurs a contractual liability for a *subsequent settlement* to clear his debt. Using this contractual approach, we can now demonstrate why Goethe's claim of the inevitability of credit in any society is correct.

Credit and the Exchange of Services

Two types of goods are voluntarily offered for exchange in markets: commodities and services. By definition, a commodity is a tangible physical entity not intrinsically dependent on time (e.g., an apple, a phonograph record or an automobile), while a service is an activity or process that is intangible and intrinsically sensible only with the passage of time (e.g., a gardener's chores, a concert or a taxi ride). In a monetized economy, sellers of either type of good

receive money or a promise to deliver money at a specified future time.

If only commodities were exchanged, it would be possible always to use money alone and never incur a debt. Services, however, by their very nature, cannot be exchanged without one party, either seller or buyer, extending credit to the other. Hence, a law attempting to enforce Shakespeare's admonition would not prohibit the sale of apples, automobiles or clothing; it would, however, prohibit the renting of a house, the purchase of a ski-lift ticket or the hiring of labor. In each of these latter examples, the transaction entails the exchange of money *before or after* the completion of the activity with, necessarily, a concomitant issuance of credit.⁹

Thus, Goethe was right: each of us inevitably engages in credit transactions every day. For example, we extend credit to our employer and receive it from our electric utility. If services of any form are to be exchanged, credit must be offered either by the seller—as in the typical employment arrangement where wages are received after the services have been delivered—or by the buyer—as in entertainment activities where the purchase of a ticket precedes the concert, game or movie.¹⁰

Clearly, credit is inextricably bound up with selling services in a monetized economy in order to avoid the problem of making an indefinitely large number of infinitesimal cash payments. Yet money and credit are simply alternative means of lowering the cost of exchanging goods relative to a primitive barter system. Thus, even some commodities might be too costly to exchange in customary ways if credit were ruled out (e.g., home-delivered newspapers or raw materials purchased by firms).¹¹

⁹Note that this would also rule out the existence of any firm other than owner-operated producers of commodities.

¹⁰Barter exchange of services is conceivable as suggested in the maxim, "You scratch my back and I'll scratch yours." Yet, even here, credit sneaks in unless the exchange is simultaneous.

¹¹Credit extended by sellers of raw materials is an especially important example. If credit were not extended to producers, either deliveries would have to be made more frequently (in smaller lots) to match producers' cash flow from sales of output, or the material-using firms would have to tie up more of their capital in raw material inventories and, hence, less in the capital to process these materials. Alternatively, firms would find it more advantageous to be vertically integrated—i.e., to own their suppliers—than to acquire these materials from other firms. See "Credit Allocation: An Exercise in the Futility of Controls" (Citibank Economics Dept., 1979), p. 40. In any case—more frequent delivery, larger inventories in capital, or more vertical integration—resources would be less productively allocated than when credit is extended.

⁸Under Anglo-American law, an enforceable contract must have three elements:

- (1) There must be an offer;
- (2) There must be an acceptance precisely matching the offer—else it is a counter-offer;
- (3) There must be consideration—i.e., the offeror or acceptor must make some performance that would be a detriment to him if the agreement were not fulfilled.

See "Contract" and other referenced citations thereunder in Henry Campbell Black, *Black's Law Dictionary*, 5th ed. (West Publishing Co., 1979), pp. 291-94, 277.

The Relationship Between Money and Credit

Money and credit are both substitutes and complements in the exchange process. On the individual level, money and credit are potential substitutes for mediating any exchange of commodities. On the societal level, money and credit are complements in the exchange process; each provides a function necessary to some exchanges that the other cannot fulfill. In fact, credit is a more general medium of exchange than money in that it facilitates exchange involving time—both in permitting the sale of services and in permitting differing delivery dates in exchanges of commodities; money without credit can act as the exchange medium only for a commodity. Yet, money is likewise crucial to the functioning of credit through its role as the primary means of settlement.

Monetary theorists generally have agreed that money in modern economies is anything that fulfills all of the following functions:

1. Medium of exchange,
2. Store of value,
3. Unit of account,
4. Standard of deferred payment.

Most economists have argued that the crucial characteristic in this list is its functioning as a medium of exchange. Typically, they have argued that any durable good can fulfill the remaining three functions, but only money can fulfill the first.

However, we have seen that credit also fulfills the medium of exchange function. Credit in our discussion has taken a special form—namely, credit measured in units of money and, implicitly, with the deferred payment to be made in units of money. In exchange systems with money and credit acting as exchange media, the other three functions in money's repertoire take on an importance not apparent in the conceptual monetary exchange models without credit.

Without agreement on the unit of account, credit transactions would have all the disadvantages of barter except simultaneity. Anthropologists, in contrast to economists, have placed more emphasis on the unit of account function because their focus is on how a monetized exchange system evolves from a barter system rather than how an extant monetized

exchange system functions.¹² From this vantage, they have documented that, in moving from barter to indirect exchange, the most useful function of primitive monies is the commonly-agreed-upon valuation unit.¹³

Finally, credit mediation of exchange is facilitated by the universal acceptability of money as a means of settlement—the standard of deferred payment function. All credit contracts can be settled (directly or through civil courts) by means of a money payment; that is, money is legal tender in our economy. This general agreement on the means of settlement makes credit less costly to extend, thereby increasing its availability for exchange mediation. A decentralized use of credit requires that individuals and firms be able to clear their debts individually (i.e., pairwise) with some mutually agreeable means of settlement; without such agreement on the means of settlement, credit clearing would require a costly centralized system of record-keeping much like a “barter club.”

THE RELATION OF CREDIT EXPANSION TO MONETARY POLICY

Credit is not money, but the promise of future money to the lender in return for the temporary use of current purchasing power—goods or money—extended to the borrower. Two errors that violate this logic occur every day in the financial press:

¹²See Philip Grierson, “The Origins of Money,” *Research in Economic Anthropology*, Vol. 1 (JAI Press, Inc., 1978), especially pp. 9-12 for evidence on the importance of standard of value in explaining early monetary systems. See also George Dalton, “Primitive Money,” *American Anthropologist* (1965:1), pp. 44-65; and Denise Schmandt-Besserat, “The Earliest Precursors of Writing,” *Scientific American* (June 1978), pp.50-59.

¹³In this context, it is ironic and revealing that contemporary “barter clubs” use dollars as the unit of account but not as an exchange medium. Consider these descriptions from “As Barter Boom Keeps Growing,” *U.S. News and World Report* (September 21, 1981), p. 58:

A participant lists items for sale, and they are advertised to the other members. If a listed item is sold, the former owner is issued trade credits—sometimes called trade dollars. These credits can later be used to purchase goods and services from other members. . . . “We don’t make outright trades; we perform a banking function. . . .” This is also the method by which every “barter exchange” profiled in the article appears to be organized:

Besides credits, most barter exchanges issue barter cards that can be used for purchases at participating merchants. Through the Trade Bank International exchange, a Memphis dentist began receiving customers who used their barter cards for dental work. Within a year’s time, the dentist accumulated enough trade dollars to buy carpeting for his office, install new signs and pay for flying lessons.

1. Referring to the interest rate as the price of money;
2. Identifying available credit as money.¹⁴

The first error is so commonplace that its repetition makes it seem valid; nonetheless, the interest rate is not the price but the rental rate for a dollar or, properly expressed, any other good. The price of a dollar is a dollar's worth of something—certainly more than a mere percentage of a dollar. No one would refer to the rental rate at Hertz as the price of a new Ford, or to the rent on a house as its purchase price, but the confusion of interest on credit with the price of money has become so common that the error no longer jangles our sensibilities. Yet the distinction is not only obvious but as important for money and credit as for owned and rented automobiles.

Similarly, the second error, referring to available credit as money, also escapes rebuke through frequent use. The annual total of credit extensions is many times larger than the year-to-year increases in either M1 or M2, and, in recent years, has been larger than the stock of M1. Considering the consumer sector (which accounts for over 60 percent of national income), a large share of credit extensions, almost two-thirds, are by institutions other than commercial banks and, therefore, do not entail monetary expansion. Considering only installment consumer credit, about 40 percent of such credit is extended by non-depository institutions with about 20 percent being extended by retailers and gasoline companies. In these retail extensions, money affects the transaction only through the anticipated monetary settlement.¹⁵

These errors are substantive for they focus the public's evaluation of monetary policy on regulating the flow of credit instead of controlling the growth of the stock of money. Controlling the rate of growth of the money stock in a predictable fashion enhances the predictability of the future availability of the means of settlement. This regularity of monetary expansion makes for better-informed, intertemporal decision-making and, therefore, contributes to the stabilization of credit markets. When non-monetary shocks occur, the predictable availability of quantities of money in the system allows market-

determined signals—that is, interest rate changes—to allocate credit efficiently to adjust to the shocks.

Conversely, attempting to control interest rates requires the monetary authority, in effect, to allocate credit at the cost of making the growth rate of monetary expansion less predictable; since this makes the real future value of the means of settlement more variable, credit transactions become riskier, and credit markets less stable. When non-monetary shocks occur, the less predictable quantities of means of settlement with relatively fixed interest rates impede market signals from efficiently allocating credit.

Since both money and credit are exchange media, the key to effectively controlling either or both of them must be first to isolate their interconnections and mutual dependencies. This article has argued that credit is unavoidable and that a money means of settlement is necessary for a decentralized credit system. What it now addresses is how monetary and credit *expansion* relate to each other and how both of these relate to national income.

Credit and Money Creation

In contemporary market economies, the money supply grows through two types of credit transactions: the central bank creating deposits (money) and bank reserves by buying government securities, and depository institutions creating deposits (money) from increased reserves by granting loans.¹⁶

Of course, not all credit extensions entail monetary expansion. There are three distinct sources of credit extension: (1) bank and non-bank depository institutions (commercial banks, savings and loans, credit unions, mutual savings banks); (2) non-depository financial intermediaries (finance com-

¹⁴Recent examples are (1) "The price of money—the interest rate—reflects, therefore the interaction of millions of participants in the credit market. . ." Henry Kaufman, *Washington Post*, September 23, 1981; (2) "As long as the Federal Reserve Board maintains its current course, credit—or money available to lend—will remain tight." Harry B. Guis, *Christian Science Monitor*, September 21, 1981.

¹⁵Source: *Federal Reserve Bulletin* (January 1982), Tables 1.21, 1.56, 1.57, 1.58, 2.16.

¹⁶In other words, modern monetary systems have a fiat base—literally money by decree—with depository institutions, acting as fiduciaries, creating obligations against themselves with the fiat base acting in part as reserves. The decree appears on the currency notes: "This note is legal tender for all debts, public and private." While no individual could refuse to accept such money for debt repayment, exchange contracts could easily be composed to thwart its use in everyday commerce. However, a forceful explanation as to why money is accepted is that the federal government requires it as payment for tax liabilities. Anticipation of the need to clear this debt creates a demand for the pure fiat dollar, guaranteeing its exchange value. See Abba P. Lerner, "Money as a Creature of the State," *American Economic Review* (May 1947), pp. 312-17; and Ross M. Starr, "The Price of Money in a Pure Exchange Monetary Economy with Taxation," *Econometrica* (January 1974), pp. 45-54.

panies, investment banks, brokerages, insurance companies); and (3) sellers of goods (retail and trade credit). In the first case, a depository institution lends money to a borrower who in turn uses these funds to purchase goods or repay debts; the credit extension entails monetary expansion of purchasing power because it consists of checkable deposit expansion. During the last three decades, loans by such depository institutions have accounted for between 35 and 50 percent of the annual total of credit market funds extended to the non-financial sector.¹⁷ Alternatively put, more than half of the credit extended annually in U.S. financial markets does *not* entail deposit expansion.

In the second case, a non-depository institution (e.g., a consumer finance company) issues the credit or buys the accounts receivable of a credit-issuing seller. The latter method of credit extension is called factoring, and non-depository institutions fund this activity by either selling debentures directly or by acting as an agent for a depository institution. Under either method, the extension of credit does *not* entail an expansion of deposits but a *reallocation* of existing deposit holdings.¹⁸

Finally, in case three, credit may be extended directly by the seller of goods and held as accounts receivable. Often this credit is financed by the sale of commercial paper issued by the seller/credit-issuer (e.g., firms with their own financial subsidiaries such as Sears or General Motors). In these instances, whether the firm holds its own accounts receivable, factors its accounts receivable or sells commercial paper, the extended credit represents an increase in purchasing power not created by checkable deposit expansion.

¹⁷Source: Board of Governors, Federal Reserve System. Of course, this credit expansion is limited by bank reserves under a given set of reserve requirements and is consequently directly controlled by the monetary authority. For this form of credit, additional credit control authority would be superfluous. This case also covers bank credit card usage since credit issued by a seller to a buyer against a bank card becomes a demand deposit increment as soon as the seller/credit-issuer submits the credit invoice to the agent bank. In both types of credit extension, direct or credit card, a depository institution creates money matching the extended credit.

¹⁸If a depository institution issues a loan to a creditor using the accounts or debt as collateral, then the credit extension has the same one-for-one expansion of deposits as if the loan were directly placed. From 1977 through 1980, the percentage of installment loans by non-depository institutions was .39, .37, .40, .45 respectively; source: *Federal Reserve Bulletin* (September 1981), table 1.57. A breakdown for non-installment credit has not been present in the *Bulletin* since 1975, but from 1965 to 1975, commercial banks extended only about one-third of single-payment non-installment loans.

In the second and third cases, credit extensions substitute for monetary mediation, while, in the first case, a dollar of money is created by each dollar of credit extended. Thus, for the case of loans by deposit creation, credit expansion has no apparent impact on the relation between the narrowly defined money supply and income since M1 and credit move together; however, in the latter two cases, credit substitutes for money which apparently would change the ratio of income to money supply.

Yet, to the extent that credit arrangements increasingly provide as ready a source of purchasing power as narrowly defined money (M1), the appearances of these cases are somewhat misleading. There should be an incentive to reduce M1 holdings and to increase the non-M1 portion of M2 holdings. For example, given the rising acceptability of bank credit cards—about 30 percent of U.S. retail and service establishments accepted them in 1972, approximately 50 percent in 1981—the utility of holding a reserve of currency or demand deposit balances in order to mediate unforeseen or spur-of-the-moment purchases has been significantly reduced for consumers.¹⁹ Still, to clear the short-term credit card debt at month's end, a ready source of funds to shift to demand or other checkable deposits remains necessary. Consequently, even if the proportions of cash and credit purchases were constant, given the increasing acceptability of credit as an exchange medium, it would not be surprising to see consumer holdings of demand deposits decline relative to purchases (i.e., to have had a rising velocity).

IMPLICATIONS OF RISING CREDIT FOR MONETARY GROWTH AND ECONOMIC ACTIVITY

If all credit extensions represented monetary expansion, then controlling monetary growth would control credit. The same constraint that limiting reserves imposes on deposit expansion also limits

¹⁹The total number of merchant (i.e., retail and service) establishments in the United States rose less than 2 percent per year during the 1960s and 1970s, while the number of merchant outlets accepting MasterCard and VISA rose at over 8 percent and 9 percent per year, respectively. (Sources: *Statistical Abstract of the United States, 1980* (U.S. Dept. of Commerce, Bureau of the Census), 101st ed., and data supplied by VISA and MasterCard). To estimate the percentage of merchants accepting bank cards, we estimated total merchants for 1981 by extrapolating the 2 percent annual growth rate from 1977 forward. This was then divided into the number of merchant outlets that accept MasterCard.

credit extensions, and inflation policy can properly focus on controlling money growth, leaving the market to allocate credit. As we have seen, however, depository institutions account for less than half of the credit annually extended in the United States. Consequently, might not the purchasing power created by non-deposit credit extensions render monetary policies undertaken through control of monetary growth rates ineffective? The answer is no: money in its role as the means of settlement constrains non-depository as well as depository credit.

If an increase in the use of credit alters the money-income relationship, the income velocity of money will rise. That is, if a larger share of transactions by households or firms can be mediated by credit, those households and firms, relative to their incomes, will plan to hold less M1 and more of other assets, including non-M1 deposits. As this substitution occurs, the ratio of nominal income to M1 (velocity) will rise. Whether such a change will occur for all monetary aggregates, narrow and broad, depends on the extent to which substitutions of non-M1 assets for M1 comprise deposits included in other monetary aggregates.²⁰

Velocity, v , which is the ratio of nominal gross national product, Y , to money, M ,

$$(1) \quad v = \frac{Y}{M},$$

measures the turnover rate of the average dollar in M , that is, how many times a dollar was used in a transaction involving Y during the year.²¹ Expressing nominal income as the product of the price level, P , and real output, y ,

$$(2) \quad Y = Py,$$

we obtain an equation for the growth rate of velocity,

$$(3) \quad \dot{v} = \dot{P} + \dot{y} - \dot{M},$$

from equation 1, where $\dot{}$ indicates the annualized growth rate of each variable. From equation 3, we obtain

$$(4) \quad \dot{P} = \dot{v} - \dot{y} + \dot{M},$$

which shows the significance of velocity for monetary policy with the inflation rate, \dot{P} , as its target.

As is obvious from equation 4, if velocity is constant ($\dot{v} = 0$), then the inflation rate will be equal to the difference between the growth rates of real output, \dot{y} , and money, \dot{M} ; if \dot{v} is relatively constant but non-zero, then inflation would be the difference between the growth rates of money and real output plus that of velocity. If \dot{v} does not depend on \dot{M} or \dot{y} , then equation 4 implies that if \dot{v} is simply predictable, even if not constant, then controlling the money supply is tantamount to controlling inflation.²²

This interpretation abstracts from variations in real output, but, to the extent that fluctuations in the growth rate of money exacerbate such variations, setting a constant growth rate of money reduces that source of disturbance. Non-monetary disturbances to real output growth (e.g., the OPEC oil embargo), of course, may cause inflation to deviate from its anticipated path, but over longer periods of time, a steady growth rate of money will smooth real income growth as well as facilitate inflation predictability. This is the rationale for a policy of targeting on the growth rate of money and why its effectiveness depends upon the predictability of velocity.²³

Assessing the predictability of a variable involves two separate evaluations: point forecasts and variability. The shorter the time period considered, the relatively more important is the latter characteristic; that is, while a short-run forecast of a variable may rarely be precise, if that variable does not fluctuate wildly in a fashion out of keeping with its history, then describing it as predictable is sensible.

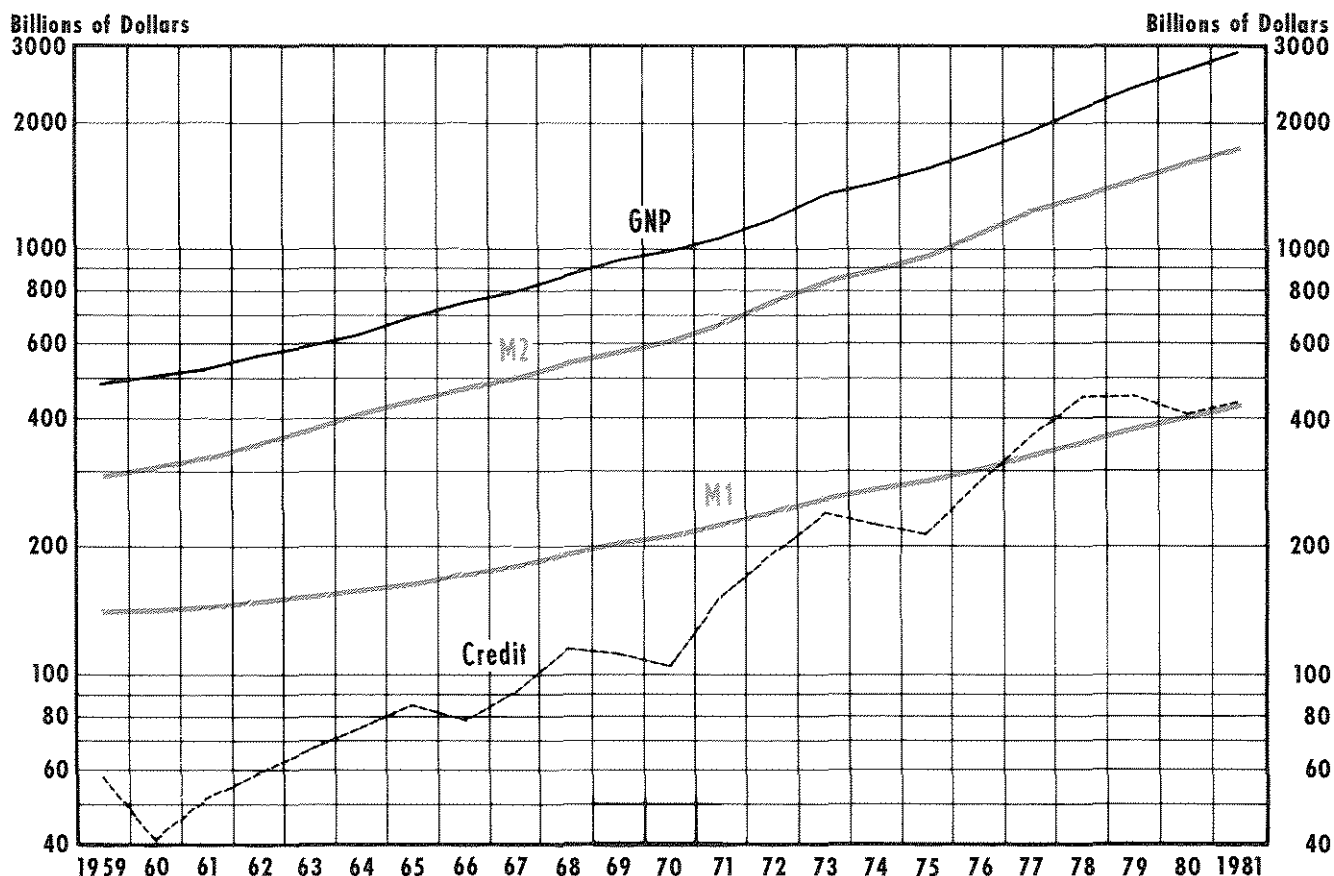
²⁰Essentially, this is again Friedman's argument that the definition of money is not an a priori but an empirical issue. "The selection [of money's definition] is to be regarded as an empirical hypothesis asserting that a particular definition will be most convenient for a particular purpose because the magnitude based on that definition bears a more consistent and regular relation to other variables relevant for the purpose than do alternative magnitudes of the same general class. . . . It may well be that the specific meaning it is most convenient to attach to the term money differs for different periods, under different institutional arrangements, or for different purposes." Friedman and Schwartz, *Monetary Statistics of the United States*, p. 91.

²¹The reciprocal of velocity measures the average holding period of a dollar, how long between final income transactions. This period is germane to the Friedman notion of temporary abode of purchasing power.

²²Note that for policy purposes we need not know precisely why the growth rate of velocity is predictable; for the purpose of formulating an inflation policy through control of a monetary aggregate, it is sufficient that it is predictable.

²³For a more detailed statement, see Milton Friedman, "A Theoretical Framework for Monetary Analysis," *Journal of Political Economy* (March/April 1970), pp. 193-238. Friedman also argues that monetary policy is not useful in counter-cyclical policy because of lags in its impacts and that, consequently, it is more useful if steady or predictable; see his American Economic Association Presidential Address, "The Role of Monetary Policy," *American Economic Review* (March 1968), pp. 1-17, and his "Monetary Policy" lecture cited in footnote 1.

Chart 1
Income, Money and Credit



HAS RISING CREDIT SIGNIFICANTLY AFFECTED THE RELATIONSHIP BETWEEN MONEY AND INCOME?

There are several ways to assess the impact of rising credit on the money-income link. Three different procedures are used here: (1) a consideration of the levels of GNP, money and credit; (2) an examination of consumer deposit holdings, credit extensions and purchases; (3) observations of the growth rates of M1 and M2 velocities.

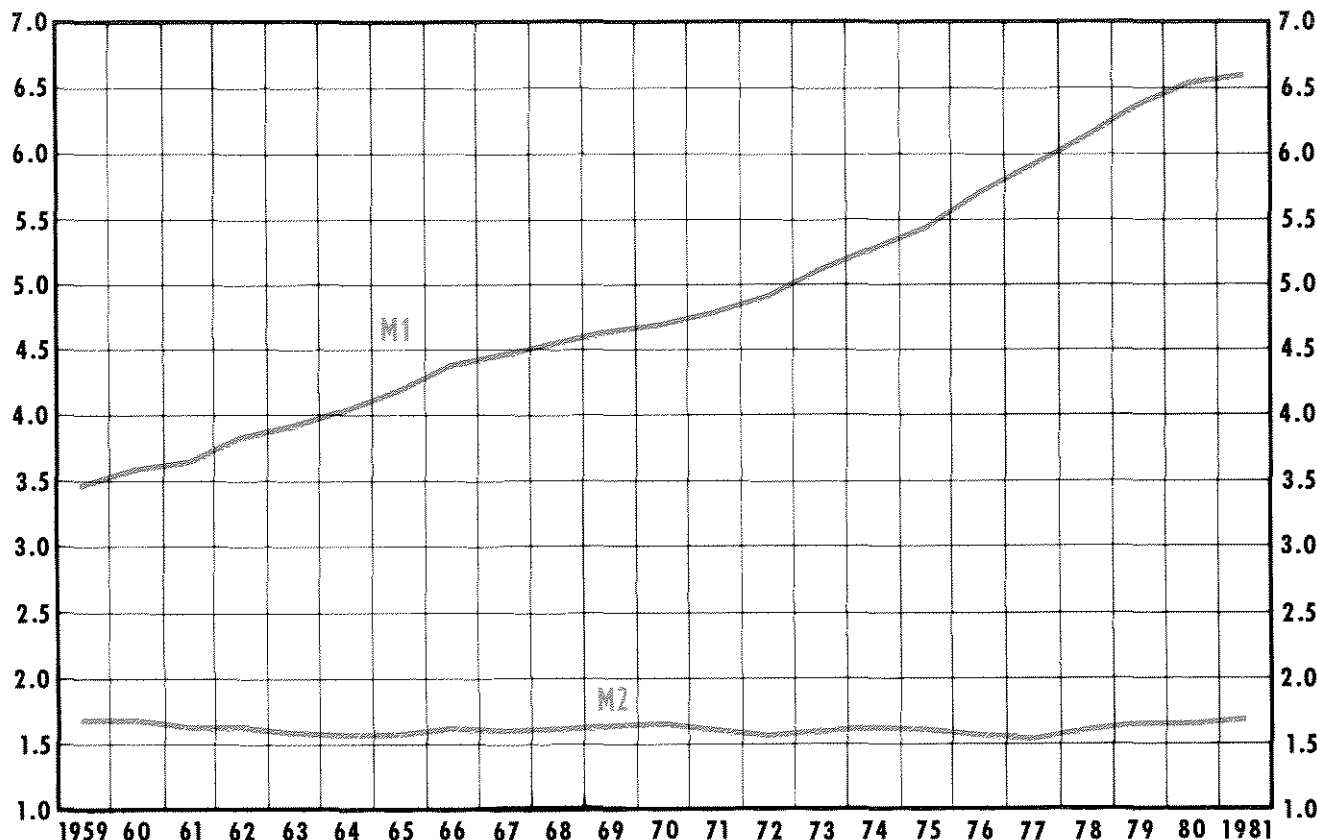
First, we can see whether the relationship between money and income growth appears to have changed in recent years by simply looking at the data on income, money and credit presented in chart 1. Chart 1, using a semi-log scale, depicts annual GNP, M1 and M2 holdings, and credit flows, with the last defined as the quantity of funds raised in credit

markets by firms, consumers and the government, plus trade credit extended between firms.²⁴ On a semi-log chart, constant growth rates graph as straight lines, and equal growth rates appear as parallel lines. In this format, it is plain that from 1959 to 1981 credit's growth was the fastest of the aggregates, that GNP and M2 have grown at roughly equal rates, and that all three grew somewhat faster than M1. The credit magnitude grew at an average rate of 9.2 percent per year, while M2 grew at about the same rate as GNP during the last two decades—8.3

²⁴Note that it is the flow of credit—i.e., extensions—not the stock of debt that is relevant here. Credit, as discussed earlier, is transaction-specific and can mediate only that transaction for which it is extended. Even if the promissory note from a previous credit transaction were subsequently used as collateral for another credit transaction, there would be another credit extension for that transaction. Unlike past money expansion, the stock of past extensions is, in itself, irrelevant.

Chart 2

Velocities of M1 and M2



percent and 8.2 percent per year, respectively. In contrast, M1 grew at a 5.2 percent rate.

In chart 2, the velocities of M1 and M2 are displayed. The approximate constancy of the M2 velocity is clearly evident here, as well as the persistent rise of M1 velocity. Not so evident, however, is the relatively *constant* rate of M1 velocity growth. Over the 1959-81 period, M1 velocity grew at around 3.2 percent. Indeed, except for a noticeable slowing in the late '60s, the velocity growth rate of both old M1 and new M1 has been between 3 percent and 4 percent since 1950.²⁵

²⁵Recently, Robert E. Weintraub, senior economist for the Joint Economic Committee of the U.S. Congress, made a similar point in a letter to the *Wall Street Journal*, October 14, 1981: "As a matter of logic, offshore and other new financial developments can contribute to inflation only if they contribute to the rate of rise of money's velocity. However, they have not. Since the early 1950's, the rate or rise of M1B's velocity has been quite steady, 3.2% yearly."

The ratio of credit to income, while persistently rising, probably understates the importance of credit in explaining the rise of M1 velocity. The credit total is misleadingly low since it represents quarterly balance sheet *changes in debt*. If credit is extended and repaid within the period of observation (one quarter for the data in chart 1), there is no change in the credit balance and, thus, no evidence that this credit extension took place; nonetheless, such extensions of credit would have mediated exchanges and contributed to spending and economic activity.

A second way to assess the impact of credit use is to focus on the behavior of individuals and families—in particular, to examine their holdings of demand and other checkable deposits as compared to credit in mediating consumer purchases. Table 1 presents data on consumer deposit holdings, credit extensions and purchases in the U.S. economy during the 1970s. By focusing on the consumer sector, three

Table 1

Consumer Deposits, Credit, Expenditures and Deposit Velocities (amounts in billions of dollars)

Year	Consumer Deposits and Credit					Consumer Expenditures and Mediations			Velocities			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Demand deposits	Other checkable deposits	Total checkable deposits	Consumer M2 deposits	Total consumer credit extensions	Personal consumption expenditures	Total cash purchases	Percent cash purchases	6 ÷ 1	6 ÷ 3	7 ÷ 3	6 ÷ 4
1970	\$ 53.6	\$ 0.4	\$ 54.0	\$ 458.5	\$187.1	\$ 634.1	\$ 447.0	70.5%	11.83	11.74	8.27	1.38
1971	58.6	0.5	59.1	532.3	215.8	692.6	476.8	68.8	11.82	11.72	8.07	1.30
1972	65.4	0.6	66.0	609.8	240.8	767.0	526.2	68.6	11.73	11.62	7.97	1.26
1973	70.1	0.8	70.9	654.8	269.0	834.3	565.3	67.8	11.90	11.77	7.97	1.27
1974	73.3	0.9	74.2	694.4	269.4	914.1	644.7	70.5	12.47	12.32	8.69	1.32
1975	78.0	1.6	79.6	796.2	280.7	1016.9	736.2	72.4	13.04	12.78	9.25	1.28
1976	82.6	3.2	85.8	921.2	318.2	1127.9	809.7	71.8	13.65	13.15	9.44	1.22
1977	91.0	4.8	95.8	1034.8	373.5	1254.5	881.0	70.2	13.79	13.09	9.20	1.21
1978	97.4	7.8	105.2	1117.5	424.2	1416.6	992.4	70.1	14.54	13.47	9.43	1.27
1979	99.2	17.7	116.9	1200.1	465.8	1582.3	1116.5	70.6	15.95	13.54	9.55	1.32
1980	102.4	27.4	129.8	1286.2	449.3	1751.0	1301.7	74.3	17.10	13.49	10.03	1.36
1981	86.6	74.4	161.0	1400.8	477.2	1909.5	1432.3	74.1	22.05	11.86	8.90	1.36

Notes: (1) Gross IPC Consumer demand deposits, year-end figures. Source: *Federal Reserve Bulletin*. Figure for 1981 is preliminary.

(2) NOW and ATS accounts, credit union share drafts and demand deposits at mutual savings banks. Source: Federal Reserve Board.

(3) IPC consumer demand deposits plus other checkable deposits.

(4) M2 minus overnight Eurodollars minus overnight RPs minus money market mutual funds minus currency minus demand deposits plus IPC consumer demand deposits plus other checkable deposits. Source: *Federal Reserve Bulletin*.

(5) Consumer installment credit extensions plus non-installment consumer credit outstanding. The installment figure is 12 times the December total for that year, while the non-installment figure is two times the December total (under the assumption of a six-month, term-to-maturity structure of non-installment credit, on average). Source: Federal Reserve Board.

(6) Expressed at annual rates. Source: Department of Commerce.

(7) Personal consumption expenditures less total consumer credit [Col (6) - Col (5)].

(8) The ratio of total cash purchases to personal consumption expenditures [Col (7) ÷ Col (6)].

technical national income accounting and comparability problems are avoided. First, all personal consumption expenditures are final goods transactions and appear in GNP; in fact, they are over 60 percent of this measure. Hence, all the credit extensions to consumers are used for final goods purchases. In contrast, commercial credit and trade credit may be financing intermediate goods. Second, a direct comparison of credit use and demand deposit holdings for an identifiable set of buyers is made possible; hence, characterizations about the relative use of credit and demand deposits in relation to income are facilitated. Third, data on credit extensions are available so that a truer picture of credit utilization can be obtained than when using balance sheet changes in debt.

The data in table 1 characterize the manner in which households have made their purchases and held their deposits during the last 12 years; these data are based on fourth quarter and December observations in each year. Clearly evident is the recent substitution of non-bank checkable deposits for demand deposits (columns 1 and 2), as well as the steady decline in holdings of demand deposits relative to total purchases (column 6) measured by their velocity (column 9). Conversely, the ratio of purchases to total consumer checkable deposits, the velocity of total checkable deposits (column 10), rose much more gradually and fell abruptly in 1981 to about its level in 1970.

As the data indicate, the proportions of consumer transactions initially mediated by money and credit (column 6) varied only slightly during the 1970s; the share of purchases that were mediated by currency and demand deposits remained around 70 percent (assuming a six-month term to maturity in non-installment credit) over the decade. Thus, over this period of rough constancy in the distribution of types of mediation, the ratio of consumer expenditures to demand deposit holdings by consumers (column 9) increased by almost 45 percent. Conversely, the ratio of purchases to total checkable deposits rose only 15 percent through 1980 (column 10). Moreover, in 1981, demand deposits fell abruptly (column 1) and other checkable deposits rose even more sharply (column 2) after the institution of NOW accounts nationwide. As a result, the velocity of total checkables fell in 1981 to approximately its 1970 value.

If we assume a narrow or transactions medium definition of money, M1, the observations over 1970-80 would be evidence of a decline in the quantity of

money demanded by households. On the other hand, if we consider total checkables in 1981 or assume a broader temporary-abode-of-purchasing-power definition, M2, then the ratios of consumer expenditures to the consumer deposit holdings provide contrary evidence. As shown in column 12 of the table, the ratio of consumer expenditures to the sum of household demand deposits, saving and small time deposits, and money market mutual funds varied comparatively little relative to the demand deposit and total checkables ratios. Thus, under the broader definition, the quantity of money demanded—at least the consumer portion—does not appear to have declined during the 1970s. In particular, 1980 and 1981 do not appear to be qualitatively different than the earlier years.

The third manner of assessing credit's impact is to determine whether the trends in the income velocities of the monetary aggregates have changed significantly in recent years. As we saw in the slopes of M1 and M2 velocities in chart 2, monetary aggregate velocities had strong trends in their growth over the two decades 1959-81. While on a quarter-to-quarter basis velocity growth rates exhibit significant variability, chart 2 suggests that over longer periods velocity growth is fairly regular. This trend regularity is substantiated in chart 3, which plots the growth rates of M1 and M2 velocities. In this chart, quarter-to-quarter (QQ), four-quarter moving average (4QMA) and 20-quarter moving average (Trend) growth rates appear. While QQ is highly variable for both M1 and M2, the 4QMA for each has a markedly smaller amplitude; considering ± 4 percent bands, only one observation for M1's velocity growth and three observations for M2's velocity growth lie beyond them. Also, the trend for each strongly underscores the apparent tendencies in chart 2; in each case, M1 and M2 velocities have stable trends, especially when measured over periods longer than a year. In particular, the charts do not reveal recent velocity growth to have been qualitatively different than in earlier years.

This lack of change in M1 and M2 velocity growth is even more apparent in table 2, which displays velocity growth rates, their standard deviations, and their ranges for 1961-81, for five-year subperiods, and for the year 1981; growth rates are computed for two observation frequencies: quarter-to-quarter (QQ) and four-quarter moving average (4QMA).

Consider the behavior of M1 velocity computed on a quarterly basis. Over the entire 1961-81 period, it has had an average growth rate of 3.16 percent per

Chart 3

Velocity Growth Rates

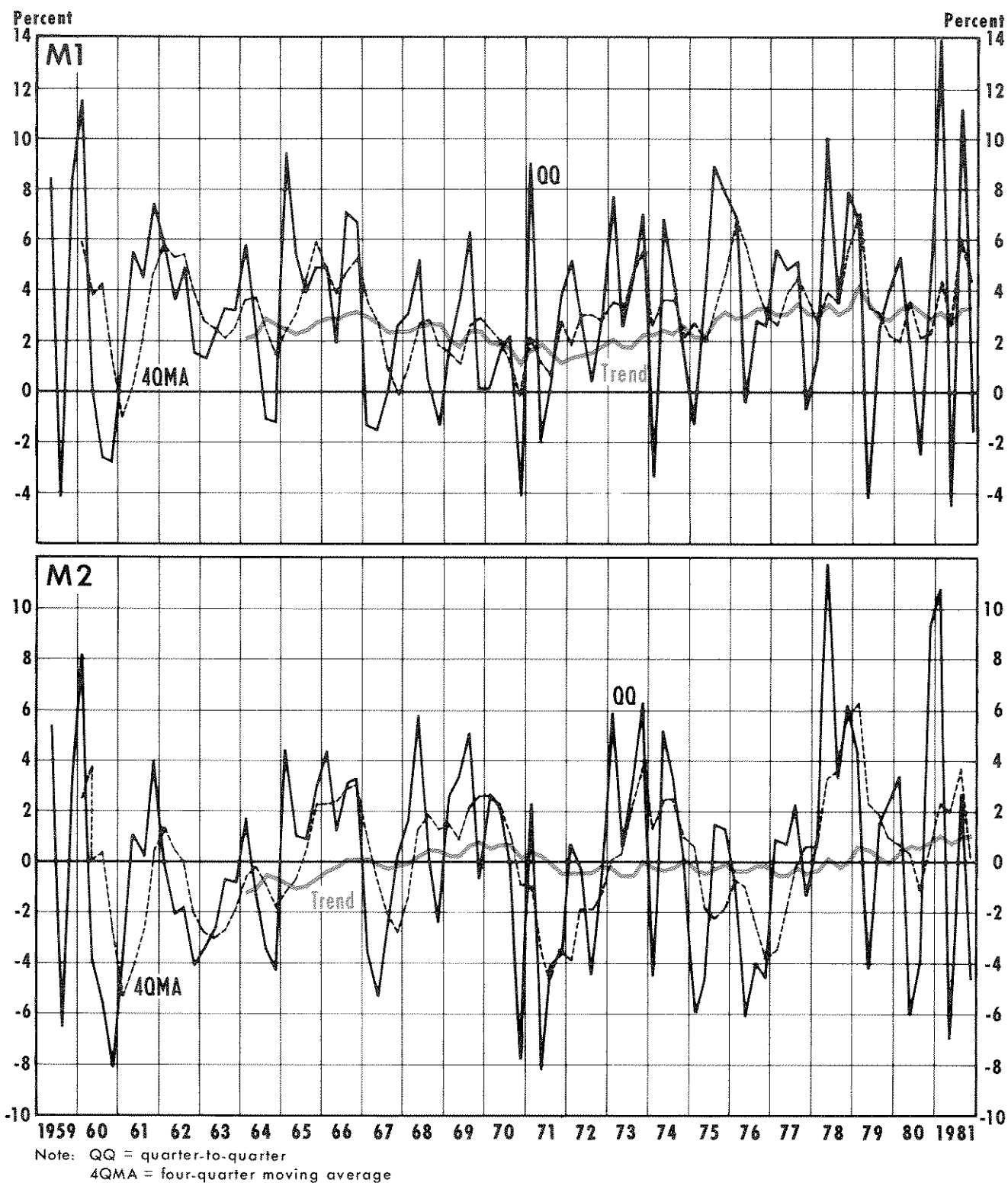


Table 2
Annual Growth Rates of M1 and M2 Velocities During 1961-81

Aggregate	Observation frequency	Velocity Growth at Annual Percentage Rates during:						
			1961-81	1961-65	1966-70	1971-75	1976-80	1981
M1	QQ	Mean	3.25	3.71	1.96	3.64	3.39	4.74
		SD	3.62	2.62	3.02	3.64	3.49	9.13
		Range	-4.47, 13.90	-1.18, 9.44	-4.06, 7.08	-3.36, 9.00	-4.16, 10.02	-4.48, 13.90
	4QMA	Mean	3.12	3.17	2.36	2.94	3.77	4.35
		SD	1.58	1.79	1.52	1.16	1.51	1.39
		Range	-1.01, 6.98	-1.01, 5.86	-.09, 5.15	.70, 5.47	1.86, 6.98	2.61, 6.01
M2	QQ	Mean	.17	-.59	.68	-.28	.81	.47
		SD	4.05	2.62	3.54	4.13	4.87	8.03
		Range	-8.23, 11.75	-4.32, 4.36	-7.81, 5.75	-8.23, 6.26	-6.09, 11.75	-7.00, 10.83
	4QMA	Mean	.04	-1.25	1.06	-.65	.60	2.06
		SD	2.36	1.87	1.72	2.41	2.68	1.41
		Range	-5.32, 6.31	-5.32, 2.29	-2.76, 3.01	-4.46, 3.96	-3.84, 6.31	.23, 3.66

year. As was apparent in chart 3, quarter-to-quarter fluctuations can be significant; yet, over the two decades, the standard deviation of its growth rate has remained about 3.00. While extrapolating the long-run velocity growth rate of M1 to 1981 underestimates the observed growth rate, the 4.74 percent rate is well within one standard deviation of either the 1976-80 mean or that of the full 1961-81 period, and represents a fluctuation that is comparatively small in terms of the range of observed growth rates during either the subperiod or the full period as shown in chart 3.

For M1, QQ and 4QMA have roughly the same average growth rates; for M2, the 4QMA growth rate is relatively more volatile than the QQ growth rate. Yet, in absolute terms the difference between QQ and 4QMA is about equal for M1 and M2 for the entire 1961-81 period (-.13) and for each subperiod except 1976-80 and 1981. For both M1 and M2, the variability (SD) of 4QMA is naturally significantly less than that of QQ. The standard deviations of velocity growth computed on a four-quarter moving average are about one-half of the quarterly version for M1 and the base and between one-half and two-thirds for M2. Moreover, the standard deviation for 1981 is smaller than for the preceding subperiod. The implication is, as usual, that quarterly monetary statistics are a less useful guide to the longer-run behavior of money than averages over longer periods.

In summary, whether we look at M1 or M2, the information displayed in chart 3 and compiled in table 2 conveys the same message: namely, the behavior of monetary aggregate velocities in 1981 is not qualitatively different than over the preceding 20-year period or any of the subperiods. This is clearest when considering the four-quarter moving average growth rates, though the more volatile quarter-to-quarter rates tell essentially the same story. While velocity growth rates were higher in 1981 than in preceding subperiods during 1961-81, there is no evidence that credit use and financial innovations have severed the link between monetary aggregates and the inflation rate.

CONCLUSION

Much of the current debate over U.S. economic policy has focused on the wisdom of targeting a monetary aggregate to control inflation. Some critics of such policies have alleged that financial innovations have both made money uncontrollable and severed its predictable link with national income and prices. Others have argued that non-monetary assets or liabilities may have a closer link than money to income over the long run. This article has focused on the predictable linkage issue by examining the principal function of money and credit, the mediation of exchange. Since credit's mediation

function depends crucially on the predictable source of monetary settlement, there is no theoretical support for assertions that the increasing use of credit has severed money's link to income. In terms of the empirical evidence for the year 1981, both M1 and M2 velocities grew reasonably close to their trend rates. This is grossly inconsistent with assertions that monetary policy is ineffective.

While the controllability issue has not been addressed in this article, an analysis of the changes in monetary aggregates in relation to Federal Open Market Committee (FOMC) directives during 1981 suggests that both M1 and M2 movements were

strikingly in accord with the intentions of the FOMC.²⁶

Consequently, there appears to be no reasonable foundation—theoretical or empirical—for abandoning the use of a monetary aggregate as the vehicle for monetary policy. Unless or until velocity becomes more unpredictable or fluctuates over ranges not previously observed, the usefulness of monetary aggregates in controlling inflation and maintaining economic stability will be undiminished.

²⁶See Daniel L. Thornton, "The FOMC in 1981: Monetary Control in a Changing Financial Environment," this *Review* (April 1982), pp. 3-22.

